5. TRAVEL TIME STUDIES OF ORIGIN-DESTINATION PAIRS

This section describes travel time surveys between selected origin and destination points for auto, transit, bicycle and HOV lane trips. The purpose of these studies is to evaluate the comparative performance of various transportation modes for the Annual Performance Report required by the CMP. These paired surveys, which were run simultaneously in the same corridor, provide insight into journey-to-work travel times between major employment centers and residential areas in Alameda County. Both auto and transit trips were surveyed for ten O-D pairs, eight during the P.M. peak period, and two during the A.M. peak period, including one where HOV lanes were used. In addition, bicycle travel times were recorded for one origin-destination pair between Emeryville and Berkeley.

Ten origin-destination (O-D) pairs have been selected by the CMA Board and by ACTAC to simulate typical commute trips on the County's major travel corridors. The first five pairs were surveyed in 1996, 1997, 1998, 2000 and 2002. Four additional O-D pairs were surveyed for the first time in 1998. An additional survey of HOV lane travel times was added for one of the O-D pairs (Fremont to San Jose) in 2000. These ten trip combinations, and the specific routes that were followed, are listed in Table 10.

In 2004, changes were made to four (4) O-D pairs (1, 3, 5, and 8) to accommodate changes in transit service in Newark, Livermore and Pleasanton. The new destinations were selected to be as close to the previous destination as possible, in a residential area, and approximately the same distance from the previous transit station or bus stop.

Table 10
Travel Routes for the Alameda County O-D Pairs - PM Peak Hour

#	Peak Period	Origin	Destination	Transit/Bus Route	Highway Travel
1	P.M.	**Hayward** Kaiser Med. Ctr, 27400 Hesperian.	**Newark** 1996-2002: Residence near Lafayette St at Newark Blvd. 2004-2008: Residence near Thornton Ave. and Ruschin Drive.	1996-2002: Walk to Hesperian, AC 97 to AC 29, at Union City BART Stn., to Newark/Lafayette, walk to door. 2004-06: Walk to Hesperian, AC 97 to AC 232, at Union City BART Stn., to Cedar/Thornton, walk to door. 2008: Walk to Hesperian, AC 97 to AC Transbay SB Line/SB Newark at Union City Blvd./Whipple Rd to Newark Blvd/Mayhews Landing Rd, walk to door	1996-2002: Walk to parking; Hesperian to Union City Blvd., to Newark Blvd., to Lafayette St.; park and walk to door. 2004-2008: Walk to parking; Hesperian to Tennyson to I-880; exit Thornton to Ruschin; park and walk to door.
2	P.M.	**Emeryville** Chiron Office Bldg., 4560 Horton St., near 53rd & Hollis Sts.	**Berkeley** Residence near Marin Circle at Los Angeles Ave.	1996-2006: Walk to 53rd and San Pablo, AC 72 or 73 to AC 43 at Solano Way, exit at Marin Circle, walk to door. 2008: Walk to Shellmound St.and Ohlone Wy, AC 57 to AC 18 at 40th St/MacArthur BART to Sutter St./Hopkins St. walk to door.	Walk to parking; 53rd St. to San Pablo Avenue, to Hopkins Street, to Marin Circle; park and walk to door.
3	P.M.	**Hayward** Cal State University at Carlos Bee Ave.	**Livermore** 1996 – 2002: Residence near Portola and North Livermore Avenue. 2004-2008: Residence near Delaware Way and North Murrieta.	1996-2002: Walk to AC 92, to Hayward BART, BART to Dub/Pleas Station, Wheels 12 to Portola & N. Murietta, walk to Portola and North Livermore Ave; walk to door. 2004-2008: Walk to AC 92, to Hayward BART, BART to Dub/Pleas Station, Wheels 12 or 12X (12 X modified to 12 V in 2008) to N. Murietta and Portola (Del Norte in 2008) ; walk to door.	1996-2002: Walk to parking; Carlos Bee, to Mission Blvd, to "A"/Redwood, to I-580, to Portola exit, to N Livermore Ave.; park & walk to door. 2004-2008: Walk to parking; Carlos Bee, to Mission Blvd, to Grove Way, to I-580 EB, to Portola exit, to Hurton to Delaware Way; park and walk to door.
4	P.M.	**Oakland** Downtown Oakland 1333 Broadway building	**San Leandro** Residence near Farnsworth St. and Chapel Ave.	Walk to BART 12th St. Station; BART to San Leandro Station, to AC 84 to Farnsworth/Manor Blvd.walk to door.	Walk to parking; local streets to I-880, to Marina Blvd, to Chapel Avenue; park and walk to door.

Table 10 (Continued)
Travel Routes for the Alameda County O-D Pairs - PM Peak Hour

#	Peak Period	Origin	Destination	Transit/Bus Route	Highway Travel
5	P.M.	**Fremont** NUMMI Plant 45500 Fremont Blvd.	**Pleasanton** 1996 – 2002: Residence near Valley Ave. and Greenwood Rd. 2004-2008: Residence near Hansen/Valley Ave.	1996 – 2002: Walk to AC 22 to Fremont BART, BART to Dubl/Pleas Station, Wheels 10 to Greenwood Road and Valley Avenue, walk to door. 2004-2008: Walk to AC 212 or 218 to Fremont BART, BART to Dubl/Pleas Station, Wheels 7 or 8 to Valley Avenue, walk to door.	1996 –2002: From parking to Fremont Blvd to Durham Road to I-680 to Sunol Blvd to Greenwood Rd.; park and walk to door. 2004-2008: : From parking to Fremont Blvd to Durham Road to I-680 to Bernal Ave. exit; to Valley Ave. to Hansen; park and walk to door.
6	A.M.	**Fremont** Residence near Thorton Ave. at Fremont Blvd.	**San Jose** Fujitsu, 3801 Zanker Road at Tasman	1998-2002: Walk to AC 27, transfer to SCVTA 140 at Fremont BART, walk to door. 2004-2006: Walk to AC 218; transfer to SCVTA 180 at Fremont BART; transfer to SCVTA 33; exit at Zanker; walk to door. 2008: Walk to ACE Fremont Station, ACE WB line #03 to Great America Station, walk to Tasman/Lickmill to VTA #330;exit at Zanker	From residential driveway to Thornton, to I-880, to SR 237, to Zanker; park and walk to door.
7	A.M.	**Fremont** Residence near Thorton Ave. at Fremont Blvd.	**San Jose** Fujitsu, 3801 Zanker Road at Tasman	Future transit service.	HOV: From residential driveway to Thornton, to I-880 HOV lanes, to SR 237, to Zanker; park and walk to door.
8	P.M.	**Oakland** Federal Building., Jefferson at 14th	**Pleasanton** 1998-2002: Residence near Hopyard Rd. and Valley Ave. 2004-06: Residence near Valley Ave. at Hansen Dr.	1998-2002: Walk to BART 12th St., BART to Dublin/Pleasanton Station., Wheels 8, walk to door. 2004-06: Walk to BART 12th St., BART to Dublin/Pleasanton Station., Wheels 7 or 8 (in 2008 Wheels 8 or 54 to Fairgrounds ACE to Wheels 53) to Valley near Hansen, walk to door.	Walk to parking; local streets to I-880 to I-238 to I-580, to Hopyard to Valley; park and walk to door.

Table 10 (Continued)
Travel Routes for the Alameda County O-D Pairs - PM Peak Hour

#	Peak Period	Origin	Destination	Transit/Bus Route	Highway Travel
9	P.M	**Fremont** Washington Hospital at Mowry Avenue.	**Alameda** Bay Farm Island, Residence near Searidge at Robert Davey.	1998 – 2002: Walk to Fremont BART, BART to Coliseum, AC 49 to Alameda, walk to door. 2004-2008: Walk to Fremont BART; BART to Fruitvale; AC 50 to Alameda; exit at Robery Davey Jr. Dr.; walk to door.	1998-2002: Walk to parking; Mowry to I-880 to Hegenberger, to Doolittle, to Island; park and walk to door. 2004-2008: Walk to parking; Mowry to I-880 to 98th Ave., to Doolittle, to Island Dr. and walk to door.
10	P.M.	**Alameda** Naval Air Station, Atlantic at Main.	**Oakland** Business near College Ave. at Lawton.	1998-2002: AC 10 to BART 12th St., BART to Rockridge, walk to door. 2004-2008: AC 63 to BART 12th Street; BART to Rockridge; walk to door.	Walk to parking; Atlantic to Webster, to I-880, to I-980, to SR 24, Claremont exit to Clifton, to Lawton, to College, park and walk to door.

SURVEY METHODOLOGY

Except for the O-D surveys on the bridges, two surveyors, one driving an auto and one taking transit (or a bicycle in one case), traversed between the designated origin and destination points, documenting their travel times and identifying any anomalies that they encountered during the course of their trip (i.e., a traffic accident). Transit trips were taken either on buses (AC Transit, UC Transit, VTA, Wheels), rail (BART or ACE), or a combination of these modes. The bicycle trip was taken on local streets in Emeryville and Berkeley. Whenever possible, the auto and transit trip started on the same day at the same time. Surveys were conducted on mid-week days (Tuesday through Thursday) during the period between May 6 and June 12, 2008 with the exception of two cases where the runs were conducted after the schools went on summer break. Most routes were surveyed on two different days. The data for O-D Pairs 1-5 and 8-10 were collected during the P.M. peak period (4:00 to 6:00 P.M.), while O-D Pairs 6 and 7 were surveyed between 7:00 and 9:00 A.M.

Travel time data were recorded for each trip. Table 11 lists the time components that were noted for each type of trip.

Table 11
Time Components of Origin-Destination Surveys

Auto Trip	Transit Trip
• Start time at origin door (walk)	• Stat time at origin door (walk)
• Auto departs parking	• Arrive at first transit stop
• Merge onto 1st freeway	• Board 1st bus/rail
	• Exit 1st bus/rail
• Merge onto 2nd freeway	• Board 2nd bus/rail
	• Exit 2nd bus/rail
• Exit from freeway	• Board 3rd bus/rail
• Arrive at parking	• Exit 3rdbus/rail
• Arrive at destination door (walk)	• Arrive at destination door (walk)

For the analysis of transit trip data, no more than half of a route's scheduled headway was used for the initial waiting time. The actual waiting time was used for all other transit transfers.

The Emeryville-Berkeley O-D Pair 2 was also surveyed by bicycle. These data were also collected between 4:00 and 6:00 P.M., on days with good weather, and no incidents or accidents affecting traffic flow. The times do not include parking the bicycle, walking to the final destination, or changing clothes at the work site.

ORIGIN-DESTINATION SURVEY RESULTS

Table 12 lists the results of the 2008 origin-destination (O-D) surveys, and also includes a comparison with the previous surveys. Of the ten O-D pairs, auto travel times have improved on all pairs with the exception of travel between Alameda and Oakland, where the travel time was almost the same as 2006 with an increase by only one minute. The largest improvement was between Fremont and Pleasanton where the auto travel time dropped by 33% or 13 minutes.

Of the nine O-D pairs surveyed for transit, transit travel times have improved on 4 pairs and worsened on 5. The largest transit travel improvement was between Fremont and San Jose where the travel time dropped by 26% (111 minutes to 82 minutes) and the biggest increase in transit travel time was between Emeryville and Berkeley where the travel time increased by 56% (45 minutes to 70 minutes).

Travel times for auto and transit for each pair are described in more detail below:

Auto Times

Overall, the 2008 auto travel times for the O-D pairs show improvements compared with the surveys from previous years, likely due to the economic downturn combined with record high gas prices. As before, the worst auto commute was between Fremont and Pleasanton, although the travel time has decreased from 181 minutes in 2006 to 145 minutes in 2008.

The auto travel time on O-D Pair 2 (Emeryville-Berkeley) was the same (22 minutes) as 2006. The largest time saving was between Oakland and Pleasanton (O-D Pair # 8) wherein the travel time reduced by 16 minutes, while the largest percentage of time improvement was between Fremont and Pleasanton (O-D Pair # 5) where the auto travel time dropped by 33% or 13 minutes.

One of the two auto travel time runs for the O-D Pair # 9 was conducted after schools were out for summer. Therefore the results should be used with caution. It shows a reduced travel time of 5 minutes compared with the auto travel time conducted when the schools were in session. Travel time between Fremont and San Jose (O-D pairs # 6 and 7) by HOV lane showed an increase of 2 minutes while travel time by single occupant vehicle showed an increase of 6 minutes compared to 2006.

Transit Times

The average 2008 transit travel times generally improved compared to previous years with only the Fremont to San Jose pair increasing substantially. As shown in Table 10, the transit routes for 3 O-D pairs (# 1, 2, and 6) were changed due to either cancellation of the service or the availability of a faster alternate route. For the same reasons, slight changes were made to routes for O-D pairs # 3 and 8.

Observations about each O-D pair are listed below.

O-D Pair 1. The transit travel time on this route was reported to be 74 minutes in the 2008 surveys, compared to 86 minutes reported in 2006. Auto travel time was 14 minutes, over 5 times shorter than transit.

O-D Pair 2. The average transit travel time was 70 minutes, 25 minutes longer than in 2006. This increase in travel time is likely due to using a different transit route in 2008. A different route was used because AC Transit Line 43 service was cancelled . Auto travel time was 22 minutes, at the same level as in 2006. The bicycle average travel time was 32 minutes, which has been consistent with previous surveys ranging between 30 and 33 minutes. It also shows that bicycles are a competitive transportation alternative on this specific route.

O-D Pair 3. The transit travel time on this route was reported to be 143 minutes in the 2008 surveys, an increase of 30 minutes from 2006. This is due to change in transit schedule. Auto travel time was 54 minutes, about nearly 60 percent shorter than transit.

O-D Pair 4. The average transit travel time was 78 minutes, 12 minutes longer than the 2006 surveys. Auto travel time was 27 minutes, a 21 percent improvement in auto travel time since 2006. Auto travel time was about a third of transit.

O-D Pair 5. The transit travel time on this route was reported to be 145 minutes in the 2008 surveys, which is 20% decrease from 2006. Auto travel time was 26 minutes, about five and half times shorter than transit.

O-D Pair 6. In the 2008 surveys, average transit time was 82 minutes compared to 111 minutes in 2006, a 35 percent improvement. This is likely due to change in transit route because the alternate route as shown in Table 10 provided shorter travel time compared to 2006. The 2008 auto average time was 27 minutes, about three times faster than transit.

O-D Pair 7. The auto travel time for this route was 23 minutes, an 8 percent improvement in travel time in the HOV lane since 2006. The HOV lane is about 20 percent faster than the mixed-flow lanes.

O-D Pair 8. The transit travel time on this route was reported to be 107 minutes, an increase of 32 minutes from 2006. This increase in transit travel time is caused by change in transit line schedules and resulted in an additional transfer. Auto travel time was 41 minutes.

O-D Pair 9. The average transit travel time was 94 minutes, 8 percent less than the 2006 surveys. One of the two transit travel time runs was conducted after schools were out on summer break. The travel time was 5 minutes shorter than the other run conducted when schools were in session. Therefore, the data should be used with caution. Auto travel time was 43 minutes, a 17 percent improvement compared to 2006. Auto travel time was over 50 percent faster than transit.

O-D Pair 10. The average transit travel time was 51 minutes, in increase of nearly 20% from the 2006 surveys. Auto travel time was 22 minutes, comparable to the 2006 surveys. Auto travel time was less than half that of transit.

Bicycle Times

As in previous surveys, O-D Pair 2, between Emeryville and Berkeley, shows that on this route, travel time by bicycle can be quite similar and competitive with auto, although it takes 10 minutes longer than by auto. Bicycle trips for this 4.8 mile segment averaged about 32 minutes, as compared to a 22 minute trip by auto and a 70 minute trip by bus transit. Bicycle commute trips may involve some additional time to deal with bicycle storage and changing clothes, which can add to total commute time.

Comparison of Travel Modes

Overall, both auto and transit travel times have improved compared to 2006. In the 2008 surveys, transit travel times range between 2 to 5.5 times longer than that of auto travel. In 2006, transit times ranged from 1.5 to4.5 times longer than that of auto travel. Consistently, Fremont-Pleasanton has the highest transit travel times, which are about 5.5 times longer than auto. It takes nearly two and half hours, to reach Pleasanton from Fremont by transit while it takes 26 minutes by auto. Travel times for Alameda-Oakland O-D pair continued to measure about double of auto. Most of the transit delay for these pairs is associated with transfers between lines. This is particularly an issue when the passenger must transfer to a bus line that does not operate at frequent intervals. Actual commuters who regularly use transit are more likely to time their trips to match known bus transfer schedules, and could have lower average travel times than these surveys indicate.

Table 12
Origin-Destination Pair Travel Times

O-D Pair	Origin	Destination	Mode	Driving Distance	1998 Avg. (min)	2000 Avg. (min)	2002 Avg. (min)	2004 Avg. (min)	2006 Avg. (min)	2008			
										Avg. (min)	No. of Runs	Range of Times	Percent Variation from '06
1*	Hayward	Newark	Auto	11.2 mi	24	22	22	16	19	14	4	13-15	-26
PM			Transit		88	92	79	90	86	74	2	56-91	-14
2	Emeryville	Berkeley	Auto	4.8 mi	25	26	25	28	22	22	4	21-24	0
PM			Transit		61	n/a	56	53	45	70	2	78-61	56
			Bike		33	30	30	33	30	32	2	32-31	7
3*	Hayward	Livermore	Auto	34.5 mi	53	45	49	61	61	54	4	73-39	-11
PM			Transit		144	152	141	120	113	143	2	153-133	27
4	Oakland	San Leandro	Auto	10.8 mi	35	29	32	41	34	27	4	23-35	-21
PM			Transit		74	64	56	70	66	78	2	79-76**	18
5*	Fremont	Pleasanton	Auto	18.0 mi	31	34	33	27	39	26	4	25-29	-33
PM			Transit		130	122	125	146	181	145	2	146-144	-20
6	Fremont	San Jose	Auto	14.8 mi	39	55	49	30	33	27	4	22-35	-18
AM			Transit		129	104	118	94	111	82	2	82	-26
7 AM	Fremont	San Jose	Auto	14.8 mi	---	35	34	27	25	23	4	19-33	-8
8*	Oakland	Pleasanton	Auto	26.6 mi	58	60	62	45	57	41	4	36-46	-28
PM			Transit		81	96	91	77	75	107	2	87-126	43
9	Fremont	Alameda	Auto	25.2 mi	50	57	53	64	52	43	4	40**-45	-17
PM			Transit		86	74	70	123	102	94	2	93-94	-8
10	Alameda	Oakland	Auto	6.8 mi	21	17	21	22	21	22	4	20-24	5
PM			Transit		51	47	45	45	43	51	2	46-55	19

* Destination for these four O-D pairs changed since 2004 -- **These transit and auto runs were performed after schools were closed.

TRAVEL TIMES ON BAY BRIDGE CROSSINGS

Note: This section has not been updated since 2004 when Caltrans stopped collecting travel time data on Bay Area Freeways and MTC took over the monitoring responsibility. MTC's annual Highway Congestion Monitoring uses different methodology for data collection that focuses only on congested freeway segments. As a result, only data for the Bay Bridge is collected by MTC. This data is not comparable to previous years because the segments termini are different. MTC has indicated that they will not be collecting data on other Bay Area bridges in future surveys as well. Depending on the availability of resources and Board direction, CMA staff will explore collecting the bridge data as part of our on-going monitoring efforts.

Table 13

Travel Times on Bay Bridge Crossings

Bridge	Time Period	From	To	2001		2003		Percent Difference
				Segment Travel Time	Total Travel Time	Segment Travel Time	Total Travel Time	
Dumbarton Bridge (SR 84)	**Westbound (toward San Mateo County)**							
	A.M.	I-880	Co. Line	25	32	7	14	-56%
	A.M.	Co. Line	US 101	7		7		
	P.M.	I-880	Co. Line	6	12	6	11	-8%
	P.M.	Co. Line	US 101	6		5		
	Eastbound (toward Alameda County)							
	A.M.	US 101	Co. Line	6	12	5	11	-8%
	A.M.	Co. Line	I-880	6		6		
	P.M.	US 101	Co. Line	17	26	14	23.5	-10%
	P.M.	Co. Line	I-880	9		9.5		
San Mateo Bridge (SR 92)	**Westbound**							
	A.M.	I-880	Co. Line	20	27	8	15.5	-43%
	A.M.	Co. Line	US 101	7		7		
	P.M.	I-880	Co. Line	8	15	7	14.5	-3%
	P.M.	Co. Line	US 101	7		7.5		
	Eastbound							
	A.M.	US 101	Co. Line	7	13	7	14	8%
	A.M.	Co. Line	I-880	6		7		
	P.M.	US 101	Co. Line	20	39**	7	24	-39%
	P.M.	Co. Line	I-880	19**		17		
Bay Bridge (I-80)	**Westbound**							
	A.M.	I-580 merge	5th Street off-ramp	--	31	--	26	-16%
	P.M.	I-580 merge	5th Street off-ramp	--	17	--	23.5	38%
	Eastbound							
	A.M.	Sterling St on-ramp	I-580 off-ramp	--	8	--	8	0%
	P.M.	Sterling St on-ramp	I-580 off-ramp	--	14	--	17.5	7%

Note – Table is not updated since 2004 as data was not available for Dumbarton and San Mateo Bridges. Available data for the Bay Bridge is not for the same segments, and therefore it cannot be compared.